



## The Falcon and the Mirage: Managing for Combat Effectiveness



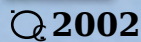
By B. A. "Tony" Kausal



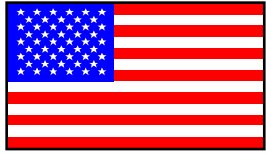
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# MIRAGE / F- 16 PROGRAM MANAGEMENT STUDY

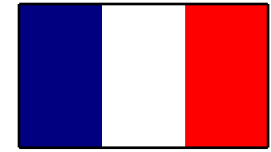
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Consulting



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# OUTLINE



- Purpose/Methodology
- Key Characteristics
  - **Defense Investment**
  - **Political/Bureaucratic System Characteristics**
  - **Management Structure and Approach**
  - **Program Manager Characteristics**
  - **Personnel,  
Disciplines/Education/Training/Experience/Turnover**
  - **Management Practices/Decision-Making, Outside  
Influence**
  - **Types of Work-- Configuration /Contracting/Engineering**
  - **Foreign Military Sales**
  - **Government/Industry Relationships**
- Final Thoughts

# **The Bottom Line**

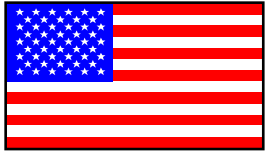
## **Augustine's Law # V**

**“One-tenth of the participants produce over one-third of the output. Increasing the number of participants merely reduces the average output.”**

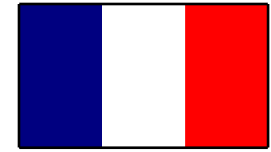
# AIRCRAFT DEVELOPMENT EXPERIENCE (WEST EUROPEAN AND U.S.)

	Barrier (Kestrel)	Jaguar (B.A.C. Viggen)	Lightning (P-1B)	Mirage IIIA	Mirage IV	Mirage F-111A	
Performance (Mach) (VTO)	.9	1.6	1.8	2.2	2.2	2.2	2.3
Manning:							
Engineering staff	106-330	320	650	400	400	50	
Program office (Government)	25	20	20	10	12	220	
Months from design start to:							
First flight	22	54	43	34	16	17	25
First production item delivered	48	64	96*	45	38	54	58
Development cost factor	1.0	1.1	1.3	1.4	1.0	1.1	1.8

\*includes 24-month schedule to reconcile a changed threat estimate with barrier constraints



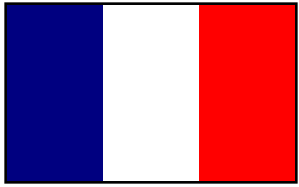
# Purpose



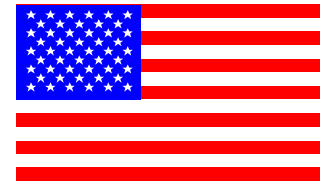
- **Case Study**
  - **Examine, Compare and Contrast the management approach and methods of the Mirage and F-16 Aircraft Program offices for insight into more efficient management practices.**

## Methodology

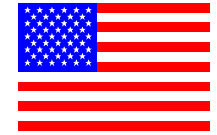
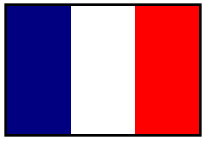
- Interviews and literature search
- **This is **not** a Manpower Study**  
**But the underlying question—**  
**How can they manage with so few p**



# Characteristics Evaluated



- **Background**
  - **Defense Investment**
  - **Political/Bureaucratic System Characteristics**
- **Management Structure and Approach**
- **Program Manager Characteristics**
- **Personnel**
  - **Disciplines/Education/Training/Experience/Turnover**
- **Management Practices/Decision-Making**
  - **Outside Influence**
- **Types of Work**
  - **Foreign Military Sales/Configuration/Contracting/Engineering**
- **Government/Industry Relationships**



# Defense Resources Comparison

## U.S.

**\$293.2B Budget**

**\$98.2B Modernization**

### **Personnel**

- **Army:** 495,000
- **Navy:** 426,700
- **AF:** 388,200
- **Marines:** 173,900
- **Coast Guard:** 37,300
- **Total** 1,483,800

**Civilians:** 790,000

**3.4% of GDP**

**33% Modernization**

## France

**\$ 26.3B (188.9FF)**

### **Budget**

**\$ 11.6B (83.5FF)**

### **Modernization**

**Personnel 440,000**

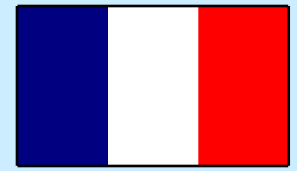
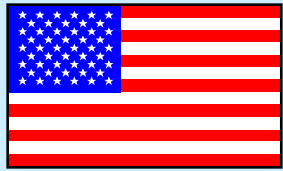
**(military and civilian)**

- **Army:** 219,900
- **Navy:** 63,300
- **Air Force:** 83,420
- **Total** 380,820

**Civilians 167,460**

**2.9% of GNP,**

**39% Modernization**



# Structure of Government

## United States

C-in-C

**President**

Cabinet  
**Appointed**  
**(43 in MOD)**

## Political Appointees

**43 in DOD**

## France

C-in-C

**President**

**Ministers De**

**Prime Minister**

Cabinet

**ected**

**(MOD)**

## Political Appoint

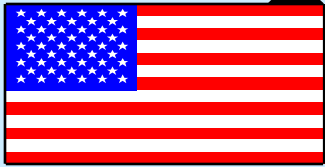
**3 in MOD**

**Split power  
between President  
and PM**

**Cabinet is responsible  
to the Parliament, but  
comes from the  
Majority party**

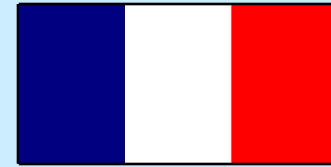
**Civilian/Military  
influence increased**

# Legislative Oversight

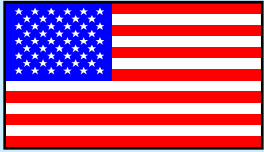


- Congress by Constitution has responsibility for raising armies, setting policies, organizational structure, and determining what we buy.

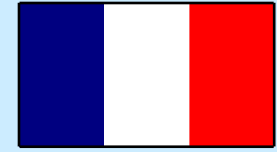
**US Legislative Branch is more powerful**



- Parliament by Constitution determines
  - Organization/Annual budget, and military programming laws,
  - But, Cannot initiate legislation in the area of national defense.
- Committees
  - Small Staffs
  - Hearings.



# Acquisition Agencies



## Characteristics

--Military Services  
Buy

Army, Navy,  
Air Force

--Decentralized  
Geographically  
(2 SPO offices)

Organizationally

Acq Personnel  
20,600(AF)

## Characteristics

--DGA buys for the  
Military

Centralized Paris

Personnel

"State Functions"

DGA (Acq)

6,639

DCE

9,079

15,718

"Industrial Functions"

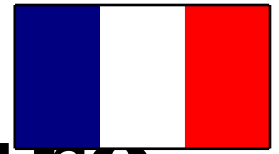
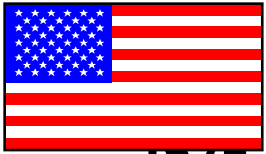
SMA

3,394

DCN

16,418

35,527



# Management Structure

## Characteristics

France: Hierarchical—one boss,  
small program

offices

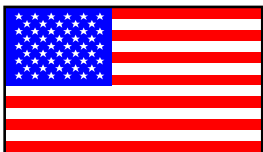
US: Complex—PEO, IWSM,

Military, large

AFMC

*Cultural Note:*  
program offices

In a lower uncertainty (risk) avoidance country like the U.S., you would find employees more willing to work with an organizational structure in which subordinates have two direct bosses (in a high uncertainty country this is to be avoided)



# Acquisition and Sustainment Management Structure

**PEO-Acquisition  
Management**

**HQ AF**

**Sustainment  
Management**

**SAE**

**HQ AFMC**

**PEOs**

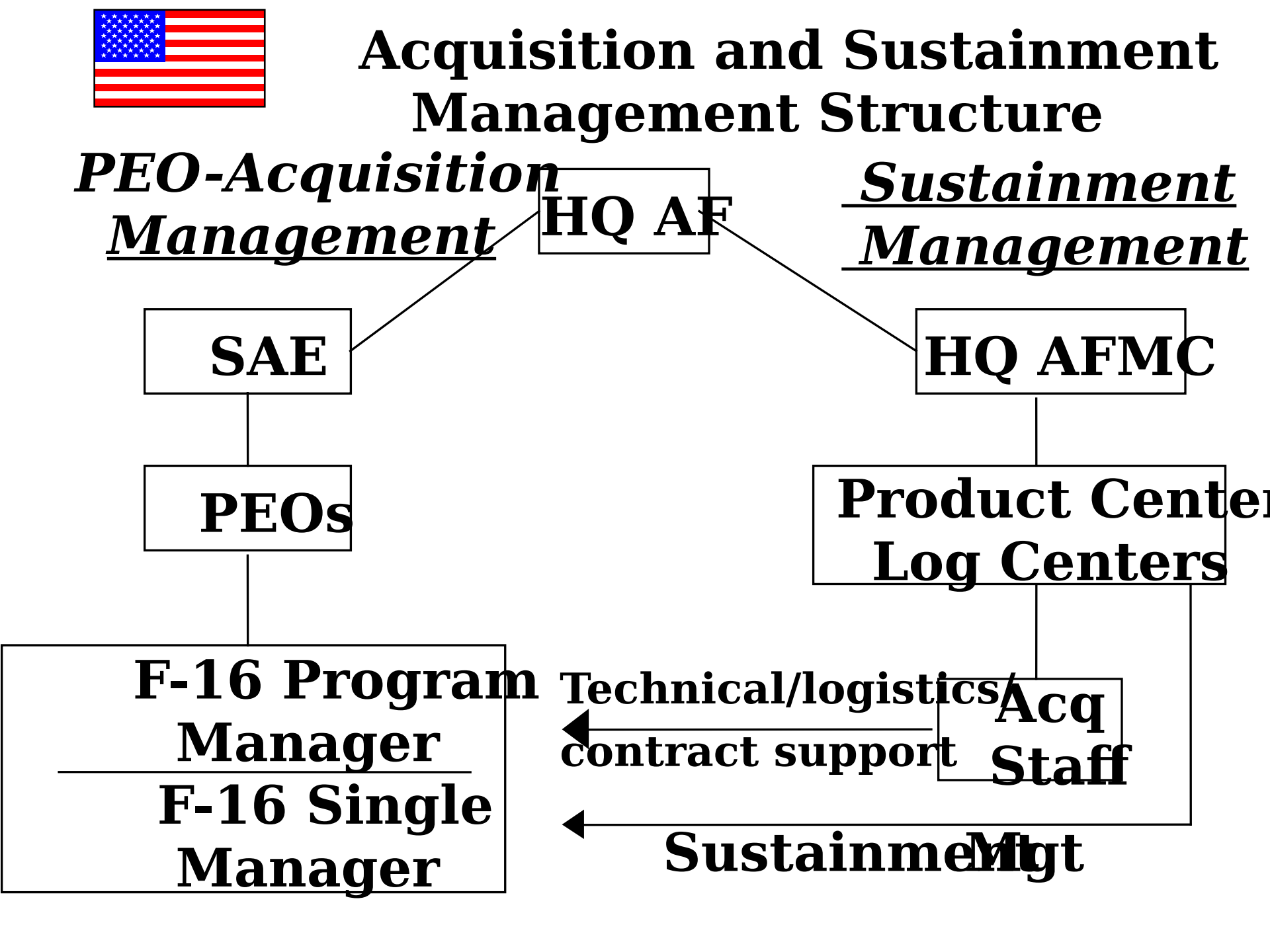
**Product Center  
Log Centers**

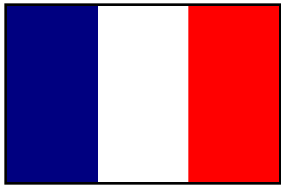
**F-16 Program  
Manager**  
**F-16 Single  
Manager**

**Technical/logistics/  
contract support**

**Acq  
Staff**

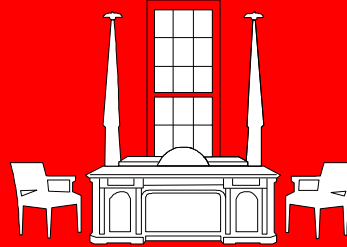
**Sustainment  
Mgt**



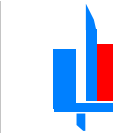


# Ministry of Defense

**Minister of Defense**



**Joint Armed  
Forces Staff**



**French Army  
Staff**



**French Navy  
Staff**

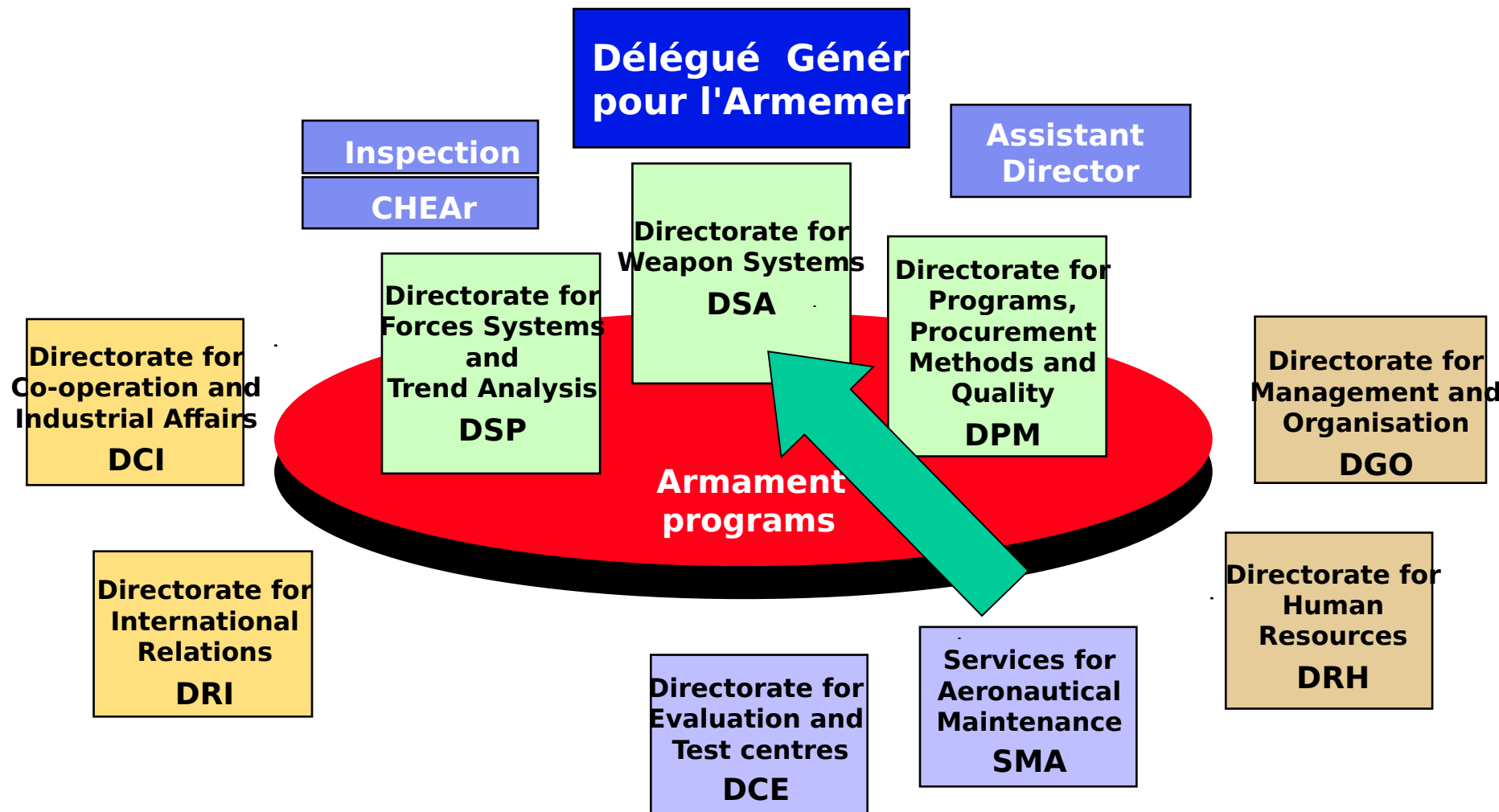


**French Air  
Force Staff**

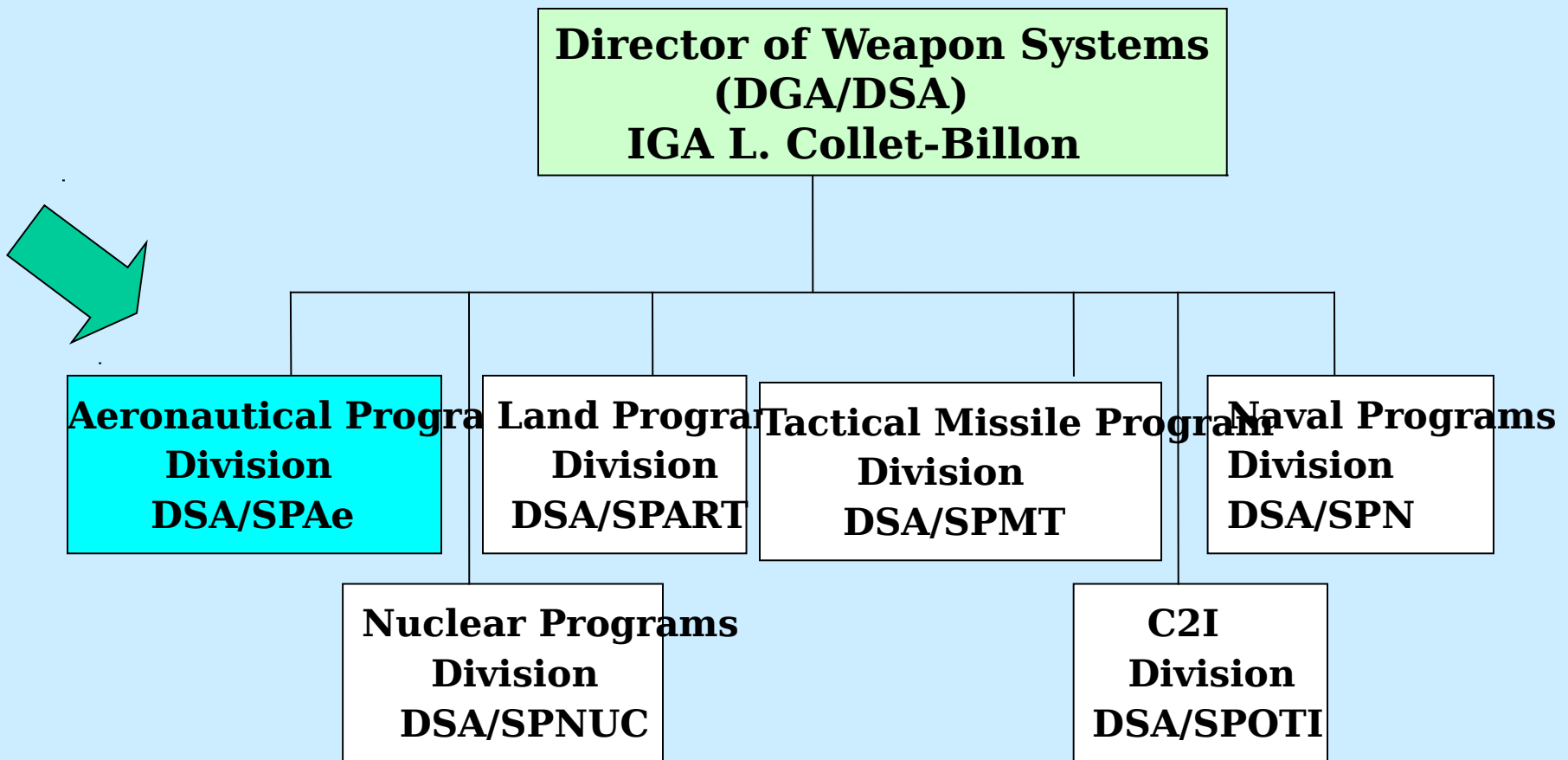


**cretariat Gene  
for  
Administration**

# Délégué Général pour l'Armement



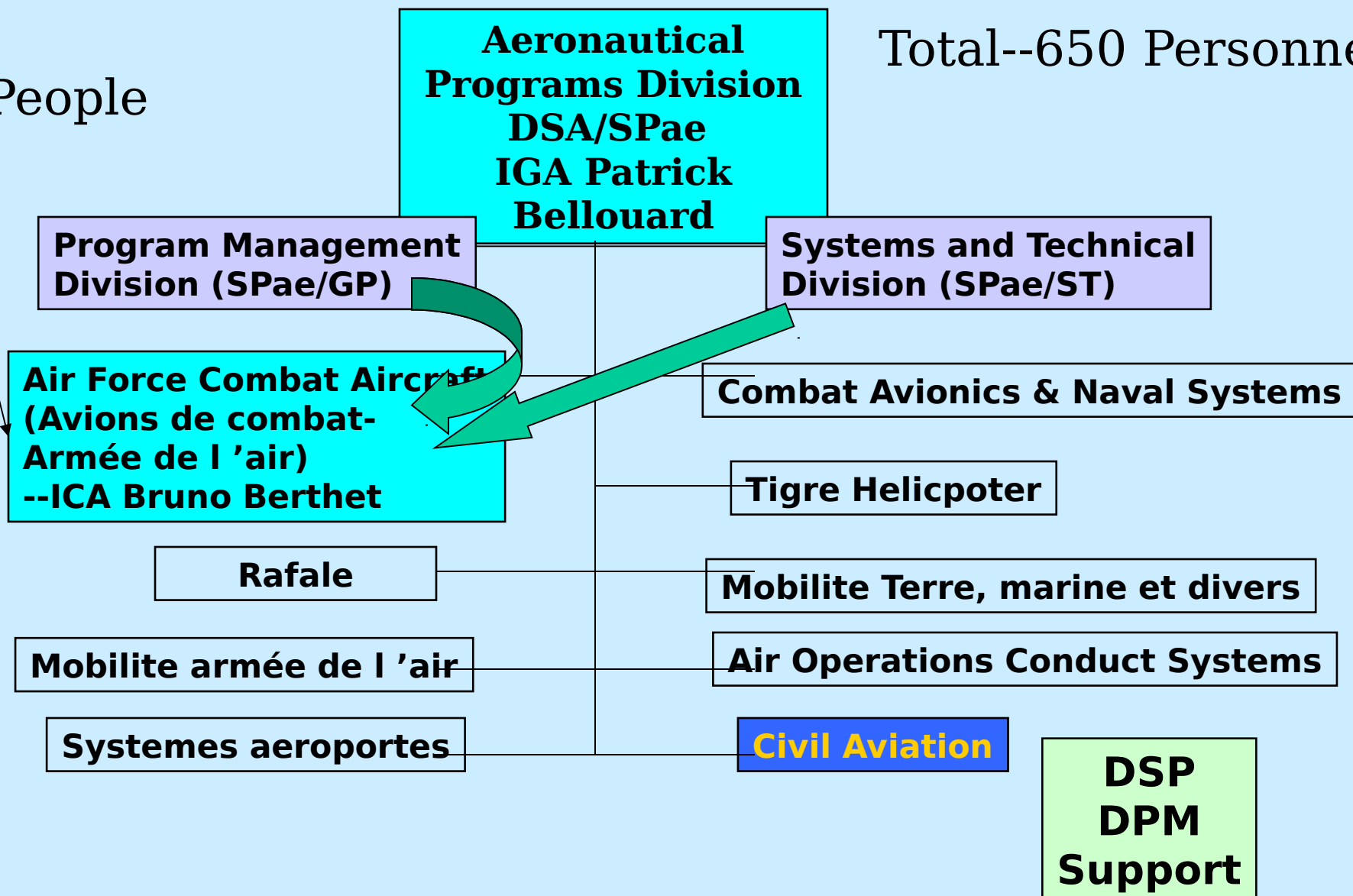
# Délégué Général pour l'Armement



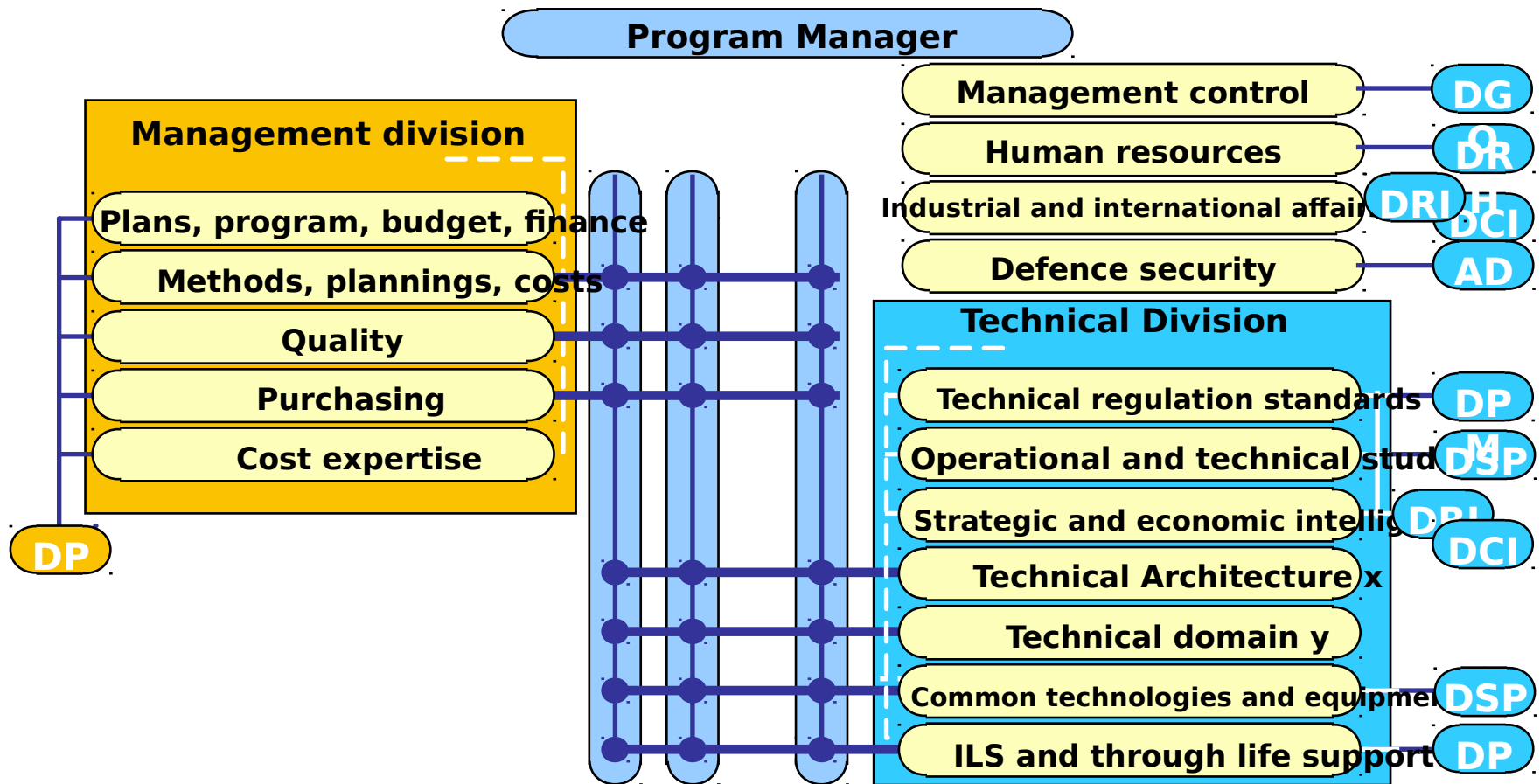
# Délégué Général pour l'Armement

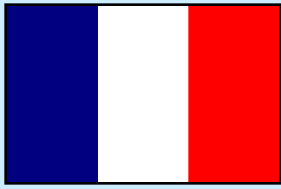
Total--650 Personne

5 People

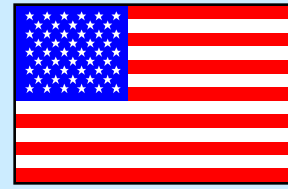


# A Matrix Organization to Manage Programs





# Program Managers



## Characteristics:

### France:

Ecole Polytechniciens (Elite),  
Very selective hiring  
process, Technical degree  
and technical training

ICA level

Promotion position

Experience before PM 16.8  
yrs

(Technical--test center,  
program offices)

More time on the job 5/3 yrs

### US:

Academy and others  
Primarily managers versus  
technical background

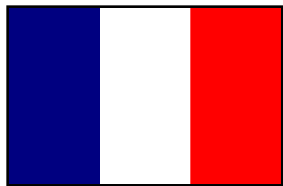
GO and Colonel Level

Promotion position

Experience before PM 10.3  
yrs

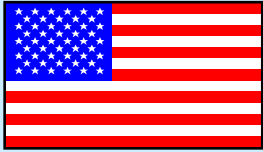
(Acquisition—  
headquarters, staff and  
managerial)

Average time on job 2.5 yrs




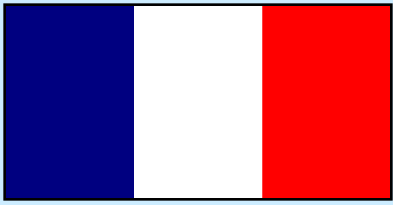
# Mirage 2000 Program Managers

Name	Time Period	Career
ICA Pierre Tamagnini	1973 to 1980	Programme manager for <i>Avion de Combat Futur</i> ) finished Career IGA (***) as CEV Director
ICA Yves Michot	1980 to 1984	<b>CEO, Aerospatiale Air</b> <b>before merger with Matra</b>
ICA Herve Groualle	1984 to 1987	Finished his career IGA Director
ICA Jean-Luc Monlibert	1988 to 1990	Currently IGA (***) Director DGA
ICA Francois Flori	1990 to 1991	Currently IGA (***) DC
ICA Pierre Bascary	1991 to 1996	Currently IGA (***) Di Nationale Superieure de l'Aeronaut et de l'Espace
ICA Bruno Delor (**) Sous-directeur	1996 to 1997	Currently IGA
ICA Patrick Dufour	1997 to 2000	achats in DGA/DPM Currently ICA in CHEM
ICA Bruno Berthet	2000 to Present	Current Program Ma

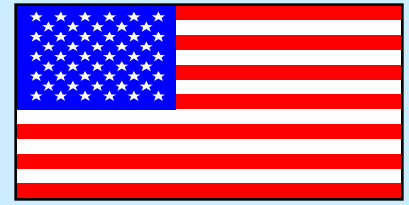


# F-16 Program Managers

<u>Program Managers</u>	<u>Years</u>
Colonel Lyle W. Cameron	1971-1972
Colonel William E. Thurman	1972-1976
Major General James A. Abrahamson	1976-1980
Major General George L. Monahan, Jr	1980-1983
Major General Ronald W. Yates 	1983-1986
Major General Robert D. Eaglet	1986-1989
Brigadier General Ralph H. Graham	1989-1992
Brigadier General Ronald T. Kadish	1992-1993
Colonel Leslie F. Kenne	1993-1994
Colonel Larry H. Cooper	1994-1998
Colonel Jeffrey R. Riemer	1998-2000
Colonel Mark D. Shackelford	2000-Present



# Personnel



**Disciplines (See following charts)**

**Education (No issue)**

**Training (No issue)**

**Experience (slightly more experience in  
F-16 (15.5  
versus 10.5)**

**Turnover (no issue—5-10% in F-  
16/Matrix)**

# Program Office Personnel by Function

## Functions Numbers

FR      US

**Achats (Purchasing)**                      9              (50)

**Qualite**                      2              (0)

**Plans,Programs,budget,finance**                      3              (40)

**Management de programme**                      3              (50)

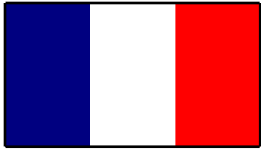
**Logistics**                      4              (97)

**Engineering**                      18              (112)

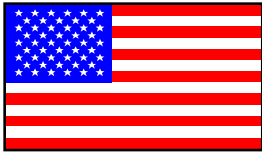
**Test and Evaluation**                      1              (3)

**Total**                      40              (352)

# **F-16 Foreign Military Sales**



**France—Little FMS work**



**---60% of the work of the SPO (by personnel)**

**---Manage by Country Teams—Total Teams= 36**

**with about 4/5 personnel in SPO East  
and 7-15  
in SPO West**

# Management Practices

## Decision-Making

### **Characteristics: (France)**

**Smaller organization (565 versus 40)**

**Fewer customers (1 versus 25)**

**Fewer Bosses**

**More informal**

**Same background (know each other—e.g. of first name)**

---

**Once a Year Briefing—then execute**

**IPT—very informal with Customer**

**(occasionally industry)**

**Both Decentralized Management**

## F-16

### Impact of Outside influence

Source	Hi	Med	Low
Congres			X
OSD			X
Service Hqs		X	
AFMC			X
Local Hqs		X	
PEO			X

## MIRAGE 2000

### Impact of Outside Influence

Source	Hi	Med	Low
Nationa l			X
Ministr y			X
Staff FAF		X	
Staff DGA			X
Hqs DSA			X
Hqs Contract or		X	



# **Types of Work**

## **Characteristics:**

**France and US Program Offices perform essentially the same types of work (See next Chart).**

**Difference: NO FMS**

**Surprises: Contracting and Engineering Changes**

# **Mirage Program Office Tasks Performed**

## **Program Management**

- Integration of program activities, Program Strategies, Program Reviews, Workforce and organization shaping, Contractor Oversight

## **Achats (Purchasing)**

- Acquisition Strategy, Negotiation, Evaluation of Proposals, Contract Preparation, Award and Administration, Modification of Contracts.

## **Quality**

- Specification preparation, Oversight of contractor, contractor's procedures, Configuration Management, and review of contractor preparation for production, acceptance and qualification of aircraft.

## **Engineering**

- Specification preparation/approval, design reviews, contractor oversight

## **Plans, programs, budget, and finance**

- Preparation of the Program budgets, management of internal financial resources, schedules, financial forecasts, review of the Contractor program financial status

## **Acquisition Logistics/Logistics Support**

- Supply support preparation, initial provisioning, development of test equipment, reliability/maintainability assessments, authorize technical orders

## **Testing**

- Test and Evaluation Planning, preparation and review of test plan

## **Armament Sales Support**

# Contracting Workload



## F-16

## MIRAGE 2000

# of Contracts	91	# of Contracts	40-80
# of Contractor	4	# of Contractor	40-80 4 major
Types/Complexity	Similar	Types/Complexity	Similar
Competition	Last source selection 1997	Competition	Rarely
Personnel	50	Personnel	20**

\*\*Personnel specialize in contracting  
have a technical background

## SPAe Contracts Activity

<u>2000</u>	<u>FY</u>	<u>1998</u>	<u>1999</u>	
				
	<b>New Contracts</b>	<b>468 (156)</b>	<b>417</b>	(100 buyers)
<b>321</b>				
	<b>Modifications</b>	<b>1843(614)</b>	<b>1161</b>	
<b>1585</b>				(20 buyers)
	<b>Value (in Euro)</b>	<b>572m</b>	<b>335m</b>	

305m

## F-16 Contracts Activity

1.

<u>FY</u>	<u>1998</u>	<u>1999</u>	
<b>\$ 2000</b>			
<b>New Contracts Actions</b>		<b>9</b>	(50 buyers)
<b>10 8</b>			
<b>Modifications</b>		<b>441</b>	
<b>343 262</b>			
<b>Value</b>	<b>\$ 629M</b>	<b>\$852M</b>	
<b>\$3.3B*</b>			
<b>F-16</b>	<b>\$ 386M</b>	<b>\$299M</b>	
<b>\$180M</b>			

**F-16**  
**Product Change**

<b># of yearly changes</b>	<b>Avg 50(20) Last 3 years</b>
<b>Complexity</b>	<b>Matrix</b>
<b>Configuration Resp.</b>	<b>Contractor</b>
<b>New Aircraft</b>	<b>4 per year</b>
<b>Configuration stability</b>	<b>Change Decreasing</b>

**MIRAGE 2000**  
**Product Change**

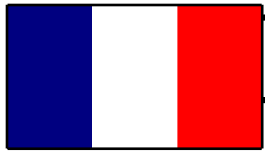
<b># of yearly changes</b>	<b>100 Changes Per year</b>
<b>Complexity</b>	<b>Unknown</b>
<b>Configuration Resp.</b>	<b>Contractor</b>
<b>New Aircraft</b>	<b>Last delivery 2001</b>
<b>Configuration stability</b>	<b>Stable</b>

# Other Characteristics looked at

## F-16

## MIRAGE 2000

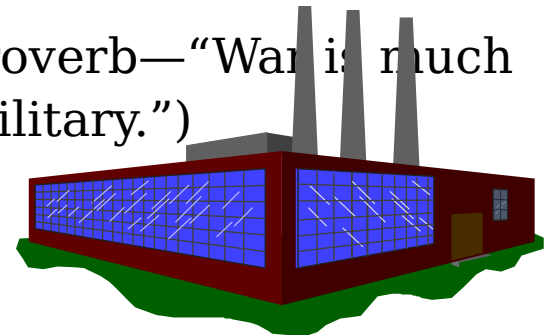
# of Customers	25	# of Customers	1
Money Stability	Annual Budgets	Money Stability	Annual Budgets, But 5 yr Programming Law
Money Types	Many (R&D production, O&M)	Money Types	Many (investment R&D prod)
# of Initiatives	Many - RTOC, AR, Lightning Bolts, ABC, ASD/AFMC	# of Initiatives	Cost Reduction
Organizational Changes	1997	Organizational Changes	1997 & 1999



# Government/Industry Relationships

## Not a factor in Office size

- Philosophy: No precise definition between public and private
  - **Predominately government owned/controlled.**
  - **DGA oversight of aeronautical and defense industries.**
- “Production is too serious a business to be left to industry.” (old French proverb—“War is much too serious a matter to be entrusted to the military.”)
- Changing relationships:



Past “Tutorial” Role with Industry

# **Final Thoughts**

## **Why Large vs Small Program Offices?**

- Some aspect is Cultural
  - American/Military/GO
  - Personal System?
  - Their, education focus which leads to the selection and training of an elite cadre of future manager--Armament Engineers!
- But, It may be a mindset
  - Management is an intellectual exercise and they will operate with small teams!

# **Final Thoughts**

- **Program Managers**
  - **Much more technical and hands on management**
- **Contracting--much more contracting and negotiation than I expected**
- **Outside Influence--both less than I envisioned**
- **Effectiveness Measures -- Both less than expected**

# Final Thought!

- Organization
  - A professional organization
  - “Skunk work” like team (size of the program closer to F117 than F16)
  - Overworking of key personnel
  - Very light reporting and huge delegations of powers (PM and his direct deputies can make quickly big decisions without little need for a lengthy approval system and without fearing to have to justify themselves in lengthy written detail)

# Back-UP

# Historical Insight

- “The unique conjunction of :
  - **The epic of French national independence and the will of creating a national defence industry**
  - **A small phalanx of elite people totally committed to the service of State and the goal of national independence.**
  - **Marcel Dassault “technical geniuses company” and “Godfather” role on the aeronautical industry.**
  - **An industrial policy in which each major contractor was de facto in total monopoly on the share of the market assigned to him by DGA.**
  - **Very little public controversy for small overruns of programs”**

## A Cultural Measurement\*\*\*

<u>Power Distance</u>	<u>Uncertainty</u>	<u>Individualism</u>
<u>Masculinity</u>	<u>Avoidance</u>	
US	40*	46
	62	91
FR	68	86
	43	71

\*\*\*See attached charts for  
 explanation  
 scale is 1-100

# A Cultural

# Measurement

- **Individualism**

- France is a contradiction in this sense since large power distance would not expect to have a lot of individualism. How much is one allowed to deviate from the norm. Is Francoise's work efforts perceived as creativity or as destructive to the activities of the organization? Both the United States and France score relatively above average on the scale, with the U.S. having a higher degree of individualism (near the top).

- **Masculinity**

- The "Masculinity" or "femininity" of society refers to the "the predominant socialization pattern for men to be more assertive and for women to be more nurturing." What does this mean to the organization? Surveys show "near consistency on men's scoring advancement and earnings as more important, women interpersonal aspects, rendering service and the physical environment as more important." Both France and the United States are in the middle of the scale, although the United States has a greater degree of masculinity in its culture. This mean that United States would favor more "bottom line" thinking than a French organization.

# A Cultural

# Measurement

- **Power Distance**

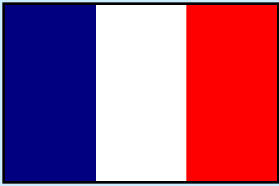
- elites, boss makes decision, employee willing to carry out (expects this to be the right way).

- **Uncertainty Avoidance**

- How much risk does one want in their life? Risk is controlled by the creation of rules and by providing stability in the job. What is also interesting is that while there is a desire for the creation of rules, the implementation of the rule may be less strict in a high uncertainty avoidance country, as is the case in France. At the extreme, employees want decisions to be made by the “boss” rather than by taking a “risk” and make the decisions themselves. In a lower uncertainty avoidance country, such as the U.S. you would find employees more willing to live with an organizational structure in which subordinates have two direct bosses (in a high uncertainty avoidance country this is to be avoided).

# **F-16 Change Proposal Activity 1996-2000**

	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	
<b>Engineering Change Proposals</b>						
<b>Complexity</b>						
<b>High</b>	<b>9</b>		<b>6</b>	<b>5</b>	<b>3</b>	<b>7</b>
<b>Slightly above</b>			<b>11</b>	<b>9</b>	<b>5</b>	<b>18</b>
<b>Average</b>			<b>5</b>	<b>8</b>	<b>18</b>	<b>2</b>
<b>Slightly below</b>			<b>9</b>	<b>20</b>	<b>15</b>	<b>15</b>
<b>Low</b>	<b>58</b>		<b>41</b>	<b>44</b>	<b>8</b>	<b>3</b>
<b>Total Approved</b>			<b>92</b>	<b>84</b>	<b>87</b>	<b>46</b>
<b>Contract Change Proposals</b>						
<b>Complexity</b>						
<b>High</b>	<b>7</b>		<b>6</b>	<b>8</b>	<b>2</b>	<b>1</b>
<b>Slightly above</b>			<b>15</b>	<b>11</b>	<b>9</b>	<b>4</b>
<b>Average</b>			<b>10</b>	<b>13</b>	<b>7</b>	<b>5</b>
<b>Slightly below</b>			<b>14</b>	<b>12</b>	<b>6</b>	<b>1</b>
<b>Low</b>	<b>10</b>		<b>10</b>	<b>6</b>	<b>1</b>	<b>1</b>
<b>Total Approved</b>			<b>56</b>	<b>52</b>	<b>36</b>	<b>13</b>



# Program Office Personnel By Rank and Mil/Civ ratio

## **Military Rank**

### **Ingenieur de l'armement**

**IA 2**

**IPA 3**

**ICA 4**

### **Ingenieurs de Etudes et Techniques d'armement**

**I1ETA 2**

**IPETA 3**

**subtotal 14**

## **Civilian Rank**

### **Fonctionnaire**

**Niveau 1**

**5**

**Niveau 2**

**15**

**Niveau 3**

**2**

**ICT**

**4**

**subtotal**

**26**

**Mil/Civ Ration**

**France >35%**

**US >25%**